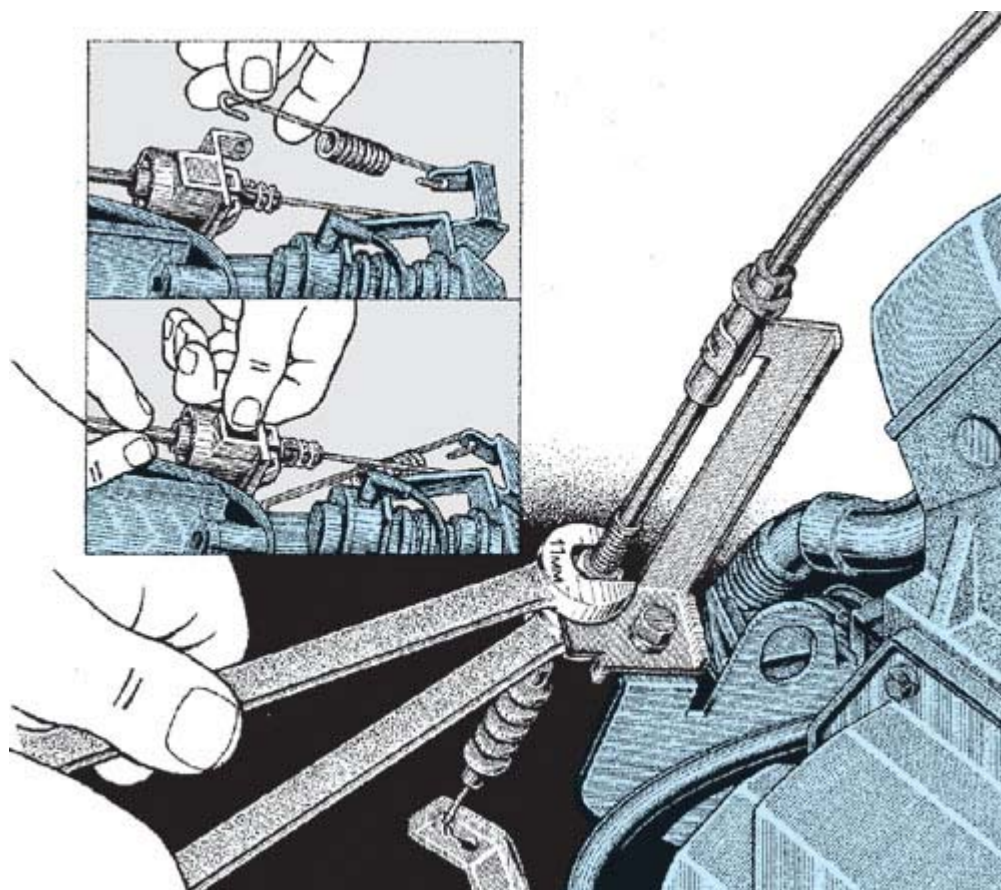


Curing A Harsh-Shifting Automatic

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Adjusting the throttle-valve (T-V) cable is generally straightforward. Some cables (typically GM's) use a pushbutton-style adjuster at the upper end of the cable. Others have a more conventional adjuster, requiring two open-end wrenches at the transmission end.

There's coffee all over your shirt, the dog refuses to ride in the car and your teenagers have threatened you with a class-action whiplash lawsuit. The fact is, when you were a teenager, you would have paid plenty for a car that got rubber in Second--but when it happens leaving every traffic light, it stops being cool.

An automatic that clunks into gear and suffers from irritating vibrations in the process is not something you have to live with. Nor is it a problem you have to drop a few weeks' pay to correct. Most of the causes are

things you can fix or prevent, and although you'll need a good service manual for adjustment procedures, specs and parts locations, you won't need a collection of special tools or instruments.

There are two basic types of automatics: the fully hydraulic and electronic hydraulic. In a fully hydraulic automatic, all the shifting is controlled by piston-type valves that slide in a valve body and direct the pressurized fluid to the appropriate bands and clutches. The road-speed signal comes from a centrifugal hydraulic device called a governor and the engine load (acceleration) signal comes from a cable or linkage between the transmission and the throttle body. Shift quality and engine load also may be signaled by a vacuum modulator, a diaphragm unit connected by a hose to engine vacuum, and by a link to a piston-type valve in the valve body.

The electronic hydraulic may have a hydraulic valve body with electronically controlled solenoids that provide signals for directing fluid flow. Or it may have a set of solenoids that directly control fluid flow. The road-speed signal comes from a vehicle-speed sensor and the load signal from the throttle body's throttle-position sensor.

Garage Shifts

If the Park or Neutral to Drive shift--called the "garage shift"--is rough, but other shifts are normal and the idle speed is high, then high idle is very likely to be the reason. There are many possible causes of high idle speed on cars with computer-controlled idle, including vacuum leaks, maladjusted throttle-position sensor and leaking O-rings around fuel injectors.

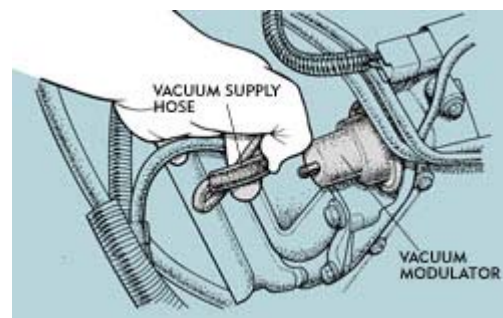
Idle speed normal? If you'd been pulling a trailer, particularly in hot weather, the automatic transmission fluid may be oxidized. This is a common cause of harsh shifts, particularly with the garage shift. You won't always get a bad smell from oxidized fluid, but if you've done the kind of high-load operation that could overheat it, a fluid and filter change might help.

All Shifts

If all the shifts are harsh, the mileage is high, the fluid has never been changed and the service has been severe (such as hot-weather trailer towing), it's possible that all the control hydraulics are sludged or sticky.

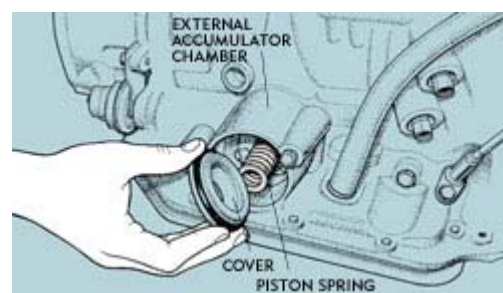
You could drop the oil pan for an inspection and if that's what you find, a straightforward fix is to bolt in a replacement valve body. That's still just a moderate investment. However, before you go this far, check out all the other possibilities that can be easily fixed.

For example, when the harsh shifting is in every gear, the hydraulic- pressure feed, or line pressure, is likely to be too high. Also, on some transmissions the design is such that harshness could result from pressure that is too low, so don't forget a fluid-level check with the dipstick.



CLICK TO ENLARGE

The vacuum line at the modulator should exhibit healthy suction when disconnected and the engine is at idle. Look for ATF inside the modulator.

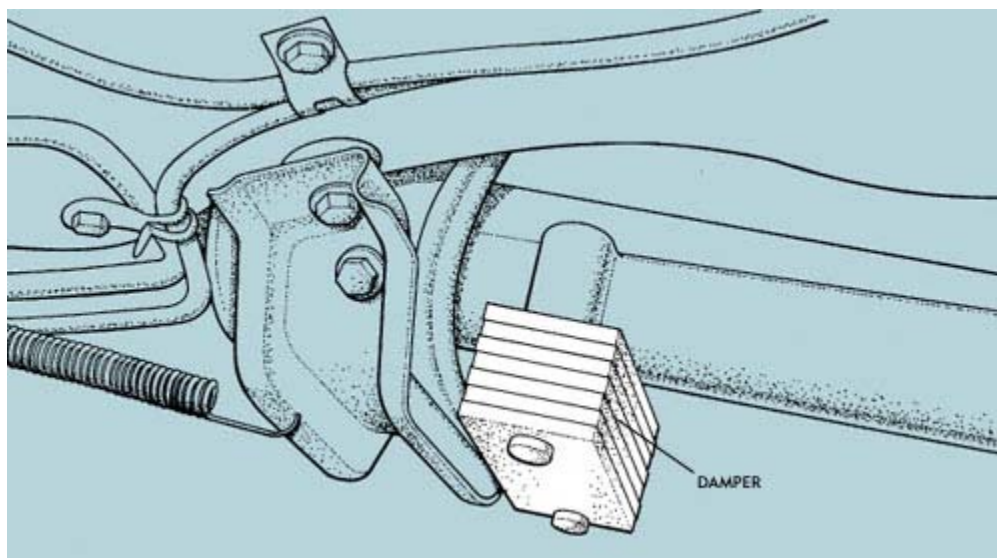


CLICK TO ENLARGE

Check for sludge or heavy varnish inside the accumulator, which could also indicate sludge in the valve body. Check the spring as well.

Before you go further on a car or truck with an electronically controlled automatic, watch the speedometer. If the readings bounce around a lot, perhaps from zero to 2 or 3 mph when the car is stopped and idling, the vehicle-speed sensor apparently is misbehaving and a bad road-speed signal may be what's upsetting the shift quality.

On vehicles with fully hydraulic transmissions, the hydraulic governors that supply the road-speed signal may cause late or mushy shifts, but are not likely to cause harshness.



Some transmissions use an external damper bobweight at the end of the tailcone to control vibration. If it's missing or loose, you could have poor shift quality.

Road Load Signals

The transmission's hydraulic pressure is modulated by a throttle valve, which responds to how hard you're accelerating. The valve is in the transmission's valve body, the assembly of hydraulic valves that routes the pressurized oil to make the shifts in most transmissions. And with an automatic transmission that is controlled hydraulically instead of electronically, the valve is connected to external linkage and a cable that goes to the engine's throttle body to provide that throttle-position signal.

However, almost all cars and trucks use a cable from the transmission to the throttle-body linkage, and that cable has an adjuster at one end. On most General Motors and Ford products, it's at or close to the throttle body. On late-model Chrysler products with the 3-speed (basically hydraulic) transaxle and many imports, including Honda and Toyota, the adjuster is

Only One Shift

Does the harsh shifting occur only in one gear change, such as First to Second or Third to Fourth, for example? The accumulator is something to suspect on fully hydraulic and partly electronic automatics. Most hydraulic clutch/band circuits have an accumulator, which is a spring-loaded piston assembly in a chamber, to prevent shift shock. If the chamber is filled with sludge or the piston spring is broken, it could be responsible. If the accumulator is external, you can remove the cover and look inside.

Of course, a sludge-filled or varnished accumulator chamber could indicate a varnished valve body under the oil pan. So one harsh shift now could become all harsh shifts soon. However, just cleaning out the one external-access accumulator now could be smooth-shift news for a long time.

at the transmission end.

The adjuster has some provision for varying the length of the cable assembly, and it has a spring that takes up backlash. The details of adjustment vary (which is why you need a service manual), but the principle--including inspection--is similar among most makes.

Inspect the spring to see if it's broken or weak (so it doesn't compensate for free play in the cable). Replace a bad spring. Check the cable-retaining brackets to ensure they're not loose or bent, and that they hold the cable housing properly. Look for a bent link at either end of the cable. Next, operate the throttle linkage and watch the cable, which should function smoothly and progressively at both ends. If it doesn't, make the adjustment.

On General Motors vehicles, a typical procedure would be to press the release button on the adjuster and pull the cable slider through the adjuster with the throttle linkage held closed, leaving just a hair of free play so there's no binding.

On a late-model Honda Accord, the usual method begins with running the engine at idle, pulling on the cable housing toward the throttle body to remove all play and checking for some free play between the bracket and the locknut on the throttle-body side (about .040 in., which you can measure with a feeler gauge). If there's not enough or too much free play, hold the locknut on the transmission side (the lower locknut) and turn the locknut on the throttle-body side (the upper one).

Things vary somewhat for electronically controlled transmissions. Because the throttle-position sensor provides the upshift/downshift signals, it's the primary item to check. If the throttle-position signal to that throttle-valve assembly is wrong, the shift quality goes down. To see if the sensor is operating within factory specs, probe the signal terminal of the sensor with a high-impedance (minimum 10 megohms) digital voltmeter, following the service manual procedure.

Both fully hydraulic and electronically controlled transmissions may use a vacuum modulator. And the modulator is a major factor in shift quality in either case. The modulator takes the engine vacuum signal

If the accumulators are on the valve body, the job is more difficult because you'll have to remove the oil pan. But at least you get a look at the valve body too. Refer to a service manual to see what's involved in an inspection.

Shudder And/Or Vibration

The automatic transmission lockup clutch, used on every modern automatic to help the carmakers meet fuel-economy standards, is responsible for all sorts of shudders, particularly if it engages at the wrong time. A simple way to determine if it's the reason for poor shift quality is to unplug the wiring connector on the transmission. Do this only for a brief test, as many transmissions will overheat fluid if they don't get clutch engagement. And be sure to unplug the right connector, as many automatics have more than one, particularly if they have electronic controls.

If the transmission becomes silky smooth with the clutch circuit disabled, check with the dealer to find out if there's a factory fix. On newer cars there may be a reprogrammed computer or a new computer module to raise the shift speed. Or there may be a recalibrated pressure switch (to accomplish the same thing) in a hydraulic passage for the transmission-speed governor.

Another cause of shudder or a vibration is a loose, broken or missing vibration damper that may be attached to your transmission. Not a lot of cars have a damper, and the damper alone doesn't directly affect shift quality. But if it's not intact and tightly mounted, the overall response of the transmission is affected, and that may worsen the feel of the shifts.

Whatever you do, don't try to cure shift problems by pouring some additive, particularly a limited-slip differential oil, into the transmission. Limited-slip oil contains a large dose of special friction modifiers that cures harsh shifts and shudder. But it also causes so much slippage that the clutches and bands will burn out fast.

What about harsh downshifts on acceleration? Well, the typical downshift, made at full throttle or close to it, generally is harsh. If it's the only harsh shift and it suddenly becomes much harsher, check the fluid level. If the fluid level is normal, and you have a fully hydraulic automatic, open the manual and look for a downshift cable adjustment. It often is similar to the

and uses it to control the shift characteristics, so if vacuum is low (because the engine is out of tune or because there's a vacuum leak), the transmission will behave as if the car is being accelerated and "stiffens" the shifts. With the engine idling, disconnect the vacuum hose and feel the hose end for a strong vacuum (at least 13 in. if you want to check with a gauge). Also test for a leaking diaphragm by inserting a cotton swab into the neck. If there is any transmission oil on the swab, the diaphragm is leaking. Replace the diaphragm unit.

High altitude and low vacuum can affect shift quality, so if you've moved up to the mountains, ask the local dealer if there's a special modulator with an altitude compensator.

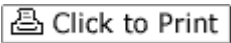
throttle-valve cable adjustment, but made at wide-open throttle. Check the manual.

The odds are very good that you'll find the reason for your car's harsh shifts somewhere among the basic items we've covered here. Then, you can send those nasty little shifts back to charm school.

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